> Upon issuance of the final modifications, it is anticipated that the permittees will appeal the permits and enter a consent agreement with DEM, which will include the December 2008 target date for completion of construction [set forth in RI Gen. Laws. § 46-12-2(f)].

RIDEM, Nutrient Permit Modifications – Response to Comments, p. 3, Appendix, Tab 3.

RIDEM correctly anticipated the appeals and settlements, but it did not live up to the promise regarding the December 2008 target date, as evidenced by at least two documents:

> Consent Agreement (final) between the Department of Environmental Management and Narragansett Bay Commission for the Fields Point Wastewater Treatment Facility, In Re: AAD No. 05-002/WRA, docket No. RIA-371, Appendix, Tab 6A ["Fields Settlement"].
>
> Consent Agreement (final) between the Department of Environmental Management and Narragansett Bay Commission for the Bucklin Point Wastewater Treatment Facility, In Re: AAD No. 05-001/WRA, docket No. RIA-372, Appendix, Tab 6B ["Bucklin Settlement"];

Both agreements provide NBC with a test period after commissioning of the initial construction to see if the plants can meet the 5 mg/l permit limits. The agreements allow NBC to argue against ever meeting the 5 mg/l limit, not only by their terms, but because the permits will expire and new permits may contain different limits (the anti-backsliding rules being inapplicable because both permits preserve NBC's challenges to the 2005 permits).

In the Fields Settlement (Attachment A of Appendix Tab 6A), RIDEM has actually agreed to a total nitrogen limit of 18.2 mg/l for the remaining term of the permit and beyond. It also sets forth a construction schedule for new facilities which extends as far as December 1, 2018 before construction must be complete. See Appendix, Tab 7 [CDM calculation of deadlines in Bucklin and Fields Point consent decrees]. In the meantime, as long as NBC complies with the Fields Settlement, the permit nitrogen limits are superseded. Yet, as Attleboro understands it, Fields Point is just finishing facilities planning based upon meeting somewhat higher concentration than 5 mg/l. Basically, NBC is to build the plant they have been planning, and then have time to see if it can make it meet 5 mg/l.

At Bucklin Point, NBC just commissioned an expensive upgrade that was designed to achieve 8 mg/l summer average. At that facility, the Bucklin

Agreement gives NBC until November 2007 to see if the plant can meet the 5 mg/l limit. If not, the Bucklin Agreement provides some time to plan, design and install further upgrades. By then a new permit will be in place. Under the terms of the agreement, completion of those upgrades can wait until July, 2013. See Appendix, Tab 7 [CDM calculation].

These settlements demonstrate two things. The nominally strict RIDEM limits are, in fact, not taking effect for some time, if ever, and are subject to evaluation of ongoing upgrades. They are, in fact, paper limits at this point. Attleboro does not believe that such limits, not applied in practice, are "requirements" of an affected state within the meaning of 40 C.F.R. § 122.4. They therefore should not and must not be applied to Attleboro (as, for instance, by requiring a limit that achieves approximately 3.4 mg/l at the relevant discharge point).

Second, the opportunities afforded to NBC for evaluating compliance after completion of existing projects would be denied to Attleboro under the draft permit proposed by EPA. Whether as a matter of law or policy, EPA should not take that approach.

There is yet another lesson in these consent agreements. It is extremely poor public policy to require an upgrade based upon requirements to meet one set of limits (such as the recently completed upgrade at Bucklin Point or the upgrade in progress in Attleboro), only to change the limits when the upgrade is done, or in progress. The waste of time, effort and money from doing so is obvious. To address that problem requires postponing the limits and possibly never imposing them, as in the consent decrees. Attleboro is in exactly the same position. During the planning for its recent upgrade, it asked about nitrogen limits and was told that such limits would come later. Now, it is faced with the potential of having to meet 8 mg/l, only to be told (Fact Sheet at 11) that it may have to meet stricter limits even if it commits resources to meet the 8 mg/l limit.

Response #A.3.b: EPA disagrees with the commenter's characterization of the consent agreements between the Field Point and Bucklin Point facilities and Rhode Island. The commenter's assertion that the nitrogen effluent limits that have been imposed by RIDEM on Rhode Island facilities are illusory, and that it would be unfair to impose actual limits on Massachusetts facilities, is inaccurate. In fact, the permit limits imposed on the Rhode Island facilities are fully enforceable legal obligations on the permittees. For example, the Bucklin Settlement states that the facility "agrees not to object to a Total Nitrogen monthly average permit limit of 5.0 mg/l for the months of May through October, so long as the schedule and interim limits outlined in [the settlement] remain in effect." The Field Point consent agreement is similarly structured. The fact that NBC (the entity responsible for the operation of Bucklin Point) reserved the right to argue the validity of future permits with limits more stringent than 5.0 mg/l has no bearing on the establishment of appropriate nitrogen limits for Attleboro. While permits reissued to NBC in the future, as well as all other discharges to the

Providence/Seekonk River system, could contain different nitrogen limits, they are unlikely to be less stringent given the available record. The Consent Agreements require that major upgrades be completed and operations optimized as soon as possible in order to achieve a nitrogen limit of 5.0 mg/l.[14]

The "requirements" of state law do not refer to the individual permit limits proposed by RIDEM for various facilities, but instead to the underlying laws and regulations on which those limits are based. EPA is imposing the nitrogen limit on Attleboro because it independently determined the limit was necessary under applicable water quality requirements in Rhode Island; EPA does not view the RIDEM nutrient permitting plan and recommendations as legally binding requirements for EPA-issued permits in Massachusetts in and of themselves, but consistent with the CWA, considered and accounted for this information when establishing the limit, as they reflected the views of Rhode Island regarding the impacts of upstream discharges on waters within its borders.

Where appropriate, Rhode Island and EPA establish compliance schedules for new permit limits that allow for a reasonable amount of time to complete necessary treatment upgrades while achieving compliance as soon as possible. Since Rhode Island Water Quality Standards do not allow for schedules in permits, schedules are incorporated in an Administrative Compliance Order or a Consent Agreement. Because the nitrogen limit in the Attleboro permit is based upon Rhode Island's standards, EPA cannot include a compliance schedule in the permit. Similar to the Rhode Island schedules for compliance with nitrogen limits, EPA anticipates establishing a schedule for Attleboro that must reasonably go substantially beyond December 2008. Like the consent agreements cited above, such a schedule will also for reasonable interim limits and will allow for some time after completion of the upgrades in order to fine tune operations before a final compliance date is required. However, it is important to note that the challenges facing large facilities with combined sewers, such as the NBC facilities, in meeting a nitrogen limit of 5.0 mg/l are much greater than the challenges facing a moderate sized facility with separate sewers in meeting a less stringent limit of 8.0 mg/l.

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[14] EPA believes it is reasonable to assume that technically achievable reductions associated with the legally enforceable permits issued to Rhode Island dischargers will actually occur; the fact that these reductions are mandated by the Rhode Island legislature, as the commenter has previously pointed out, would seem to bolster this conclusion. To second guess the motives of the state and the discharger with respect to implementation and compliance with permit terms, as Attleboro invites EPA to do, would be mere speculation on EPA's part and would not amount to a reasonable or rational basis to assess Attleboro's permit limit for nitrogen. When accounting for existing controls on other point sources, EPA instead believes that it is reasonable to assume that validly issued permits will be complied with and pollutant reduction contemplated thereunder achieved. EPA will also be closely involved in overseeing limits in future permits for facilities in Rhode Island. In any event, regardless of Rhode Island's actions with respect to specific facilities, EPA has an independent duty under the CWA to impose effluent limits that will ensure compliance with applicable water quality standards.

The upgrades proposed for NBC Fields Point are based on achieving the 5.0 mg/l nitrogen limit. These upgrades are currently under design with a design completion date of November 2008. The NBC Bucklin Point facility is currently achieving nitrogen removal to <8 mg/l. Additional upgrades are necessary to achieve the final permit limit of 5.0 mg/l. Facilities planning for these upgrades is expected to be completed in early 2009 and at that time a design and construction schedule will be established. East Providence requires an upgrade in order to meet its final nitrogen limit and this upgrade is schedule to be completed by June 2013.

Provisions that allow for a longer period to achieve final compliance are intended to address the potential that the initial major upgrades of the NBC facilities will not result in achievement of the 5.0 mg/l limits. Facility upgrades in Massachusetts have been, and will continue to be, afforded the same considerations to the extent reasonable in the establishment and/or enforcement of compliance schedules.

It is not clear who told Attleboro that nitrogen limits would come after the current upgrade. For EPA's position relative to nitrogen limits and planned upgrades for Attleboro, see the June 9, 2003, letter from MassDEP reflecting the position of EPA and the MassDEP permitting program. Regarding nitrogen, the letters state that, "nitrogen controls are possible in the future as loading to Narragansett Bay (Ten Mile River is a tributary) needed to be reduced to reduce phytoplankton growth; this could result in a nitrogen limit being imposed on the Attleboro facility in the future," and "The agencies urge the City and their consultant to keep the possible future permit conditions in mind when planning, designing and constructing upgraded facilities at the WWTP in the near and far term. The City should factor into their financial planning the potential substantial expenses associated with the high level of nutrient controls likely to be required at the facility." In light of this communication, it is unclear why the City (unlike the Town of North Attleborough, which has also been given a 8 mg/l limit of nitrogen and whose permit is now effective) chose not to make any provision for future nitrogen limits in its planning for future upgrades. While EPA appreciates the difficulties created by having to comply with new limits which may not have been fully anticipated by the permittee when planning its upgrade, EPA is legally obligated, now and in the future, to reissue permits that are consistent with Section 301 and 402 of the Clean Water Act, which at this time requires the imposition of an effluent limitation for nitrogen, and which may in the future require additional refinements to such limit.

Comment #A.3.c. The RIDEM permits applying the new nitrogen limits were vulnerable to challenge by the permittees and, indeed have been challenged. For instance, attached as Tab 5A to the Appendix is the Request for Adjudicatory Hearing In Re: Woonsocket Wastewater Treatment Facility, RIPDES Permit No.: RI 0100111 and attachments. Attached as Tab 5B are the comments of NBC regarding its draft permits, which were restated in NBC's appeal of the permits.

The consent decrees between RIDEM and NBC also, of course, resulted from appeals based upon the illegality of RIDEM's total nitrogen limits; the consent decrees fully preserve these claims, if the planning and construction contemplated in those decrees [does] not resolve matters. Whether or not those challenges have been settled, the points raised by the papers submitted by those licensees challenging the stated rationales for the new nitrogen limits are valid and are incorporated herein by reference.

Without limitation, the defects in applying Rhode Island water quality standards by imposing an 8 mg/l total nitrogen limit on discharges in Rhode Island waters (and, *a fortiori* a 5 mg/l or an effective 3.4 mg/l limit) include:

- Failure to present a comprehensive or coherent analysis of the dissolved oxygen dynamics of the Providence and Seekonk Rivers;
- Inconsistency with prior studies;
- Ignoring the significantly different conditions in the rivers, the Narragansett Bay and the laboratory;
- Ignoring the significant nitrogen reduction programs in discharging communities and the substantial reductions in nitrogen already achieved by those communities;
- Failure to follow RIDEM's own regulatory requirements;
- Failure to complete a TMDL that would provide the necessary basis for establishing nitrogen discharge limits for the regulated plants;
- Failure to evaluate whether the mandated reduction will have any significant benefit in fact;
- Requiring significant additional public investments without scientific evidence or consensus about the effect of the mandated nitrogen reduction on the relevant waters.
- The failure to schedule review of the nitrogen limits at an appropriate time, such as the next permit reissuance date, when permitting agencies can apply the data and science that, hopefully, will be available at that time.

See, e.g. Request for Adjudicatory Hearing, In Re: Woonsocket Wastewater Treatment Facility.

Response #A.3.c:

EPA does not regard the commenter's attempted blanket incorporation by reference from a court filing in another proceeding not even involving EPA or the NPDES permitting program as appropriate. Comments must be presented in a manner that apprises EPA of the relevant issues so that it can provide a meaningful response. EPA is not required to guess at the specific relevance of the arguments made in a separate court proceeding to the facts at issue here.

Specific comments relating to perceived defects in applying Rhode Island water quality standards by imposing an 8 mg/l total nitrogen limit on discharges in Rhode Island waters have been received from CDM (appended as Attachment A to the City's comments) and are addressed below. These detailed comments appear to generally encompass the bulleted points above.

EPA fully reviews the technical and legal basis for all permit limits at the time of permit reissuance. It must do so in order to ensure that the limits comply with all applicable requirements of the CWA and to confirm that they continue to be necessary. NPDES permits have maximum five-year terms (upon expiration, the permit may be administratively continued assuming timely receipt of permit renewal application).

Comment #A.4: Even if nitrogen limits are imposed, the draft permit cannot reasonably base total nitrogen limits upon the MERL experiment, which dealt with dissolved inorganic nitrogen ("DIN"). As CDM explains:

RIDEM also errs when it uses the MERL values, which are based on dissolved inorganic nitrogen (DIN) loadings to compute total nitrogen (TN) limits in the permits. Effluents from wastewater treatment facilities often contain residual, refractory organic nitrogen that is not biologically available, as RIDEM has acknowledged in its response to comments on the Rhode Island Permits (See page 18 of 41). If one accepts the area loading approach, and it is based on data developed around DIN, then the permit values ought be presented either as DIN, or adjusted to available Total N, in much the same manner that metals limits are adjusted from the biologically available form to total metals for permitting purposes.

Response #A.4: The same comment was received from CDM and is addressed in Response B.2 below.

Comment #A.5: CDM has also demonstrated that the draft permit's limits on metals are excessive, due to a generally-applicable miscalculation (especially a failure to consider the appropriate hardness factor), several specific errors, inconsistency with other permits, and failure to accommodate plant operations that improve the overall effluent. CDM's comments are incorporated.

While EPA acknowledged the City's inability to comply immediately with nutrient limitations (Fact Sheet, p. 6), it has not done the same for metals. Yet, the situation is the same. The City has already devoted extensive resources to plant improvements and operations to treat metals. Further investment in plant upgrades for this purpose is not warranted. The City will need to require its generators to implement an industrial pretreatment program, which will take time. Imposition of the proposed metals limits therefore will require a phased implementation by both the plant and those who discharge into its system.

Response #A.5: Specific comments from CDM are addressed in the following section of this document.

EPA understands that the City may not be able to comply with all of the metals limits immediately. Any schedule developed relative to achieving compliance with nutrient limits can also address metals limits. We agree that the primary focus for reducing metals concentrations in the effluent should be on source controls, including enhanced pre-treatment requirements. EPA concurs that, if the required technical evaluation of local limits indicates the need to revise the local limits, additional time is warranted for establishing revised limits. Consistent with the North Attleborough permit, the final permit allows for 300 days to complete any necessary revisions.

The following comments were received from CDM, on behalf of the City of Attleboro, in a letter dated September 13, 2006:

Comment #B.1: EPA presents no substantive justification of its own for the conclusion that "the nitrogen limit proposed in this permit is necessary to meet Rhode Island Water Quality Standards". It merely indicates that it has reviewed the RIDEM reports, RIDEM's responses to Massachusetts DEP's comments on the draft permits and other unspecified documents, and declares that it has concluded the limits are necessary. While acknowledging both the complexity and uncertainty associated with the dynamics of upper Narragansett Bay and the application of the MERL experiments to this system, EPA presents no discussion of the factors that it evaluated in reaching conclusions exactly the same as RIDEM. In particular, various individuals provided significant technical commentary on RIDEM's analysis, some of which RIDEM attempted to answer, and others of which RIDEM did not answer at all. EPA appears not to have addressed these questions at all, even though they form the basis for the continuing appeals of some Rhode Island Permits.

Response #B.1: See responses above regarding the basis for the nitrogen limit.

Specific comments relating to perceived shortcomings in RIDEM's responses to technical commentary provided on the nitrogen analysis are addressed below.

Comment #B.2: In December of 2004 RIDEM issued a study entitled *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers* ("The 2004 Evaluation"). The study attempts to provide the substantiation of the permit limits for Total Nitrogen proposed by RIDEM for the treatment plants discharging into the Providence and Seekonk River systems. It uses research conducted by the Marine Ecosystems Research Laboratory (MERL) at the University of Rhode Island in the early 1980's on nutrient enrichment of Narragansett Bay, and data collected in 1995 and 1996 to support its conclusions. The study was developed by RIDEM when its initial efforts to construct a more

formal total maximum daily load (TMDL) analysis using a numerical model to simulate the Providence/Seekonk River systems were unsuccessful.

Based on our review as described further below, the central problems with this analysis are that:

> It does not present a cohesive analysis of the dissolved oxygen dynamics of the Providence and Seekonk Rivers. The analysis ignores fundamental and critically important factors, including local sources of oxygen demanding substances and the impacts of physical processes such as elevated temperature and stratification on the oxygen dynamics of the Providence and Seekonk Rivers.
>
> In extrapolating the results of the MERL experiments it generally ignores the significant differences between the conditions in Narragansett Bay that the MERL simulates, and the Providence and Seekonk River system.
>
> In applying the MERL experimental results, RIDEM makes significant conceptual errors which lead to flaws in its arguments.

Our concerns are more fully discussed below.

a. The analysis fails to properly analyze the oxygen deficits in the Providence River system.

The oxygen dynamics of an urban river/estuary system that receives discharges of oxygen demanding pollutants from multiple sources are very complicated. Any analysis of the conditions should take into account all potential sources of oxygen demanding substances, including the close-by discharges of two large wastewater treatment plants discharging significant quantities of oxygen demanding substances and the impacts of sediment oxygen demand reflecting the highly urbanized nature of adjacent watersheds. It should also include the impacts of physical conditions such as stratification, temperature, tidal stage, wind induced mixing and re-aeration, as well as the potential impacts of algae on the oxygen conditions. The complexity of these interactions is presumably the reason that RIDEM originally undertook to establish a model of the Seekonk and Providence River systems to develop a TMDL.

Having failed in its initial attempt to develop a numerical model of the system, RIDEM has then turned to an overly simplistic adaptation of local research. RIDEM'S analysis is based entirely on an extrapolation of the concept that excess nitrogen leads to algal growth, which can lead to diminished dissolved oxygen. The work is based solely on the nitrogen flux into the Providence river system, and draws from the system loading response in the MERL studies conducted at URI in the 1980's. The analysis completely ignores any other pollutant sources that impact the local oxygen conditions, and fails to consider major differences

between the physical characteristics of the Providence and Seekonk River systems, and that of Narragansett Bay which the MERL experiments were built to simulate.

While the literature is quite clear that nutrient over-enrichment can lead to low dissolved oxygen, this is not the only reason for oxygen depletion, and it is imperative that one fully understands the reasons for low dissolved oxygen before one launches a nitrogen reduction program based on the dissolved oxygen in the Providence River. Careful attention must be given to these other dissolved oxygen sinks that may be as important as or more important than the nitrogen flux in order to avoid the inappropriate expenditure of limited public funds.

Response #B.2.a: It is not necessary that there be a complete understanding of all factors that influence one response variable (dissolved oxygen) before cultural eutrophication can be addressed; EPA must make permitting decisions based on the best information reasonably available to it. This is especially true where the water quality impairment—cultural eutrophication—is severe and where the cause of such impairment—excessive nitrogen loading—is known, as evidenced by numerous studies. *See, .e.g., Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, RI DEM, December 2004).

The data collected in the Seekonk and Providence Rivers offers compelling evidence of excessive nutrient enrichment. Total nitrogen and chlorophyll *a* concentrations are well above, for example, the MassDEP guidelines for TN and environmental health, and the supersaturated levels of dissolved oxygen measured in the Seekonk and Providence Rivers can only result from photosynthesis or an outside physical aeration mechanism. To the extent that sediment oxygen demand (SOD) plays a role in the low dissolved oxygen levels, the decay of nitrogen-driven vegetation that has accumulated in the sediments would contribute to the SOD levels (see Response #B.2.c below), so EPA does not believe it is appropriate to completely decouple this nonpoint source of impairment from the initial point source nitrogen loading into the system.

Physical conditions such as stratification, temperature, tidal stage, wind induced mixing and re-aeration do have an effect on dissolved oxygen levels. Water quality data (11 sampling events during 1995 and 1996) were collected under a variety of conditions in order to reflect the dynamic physical conditions of the system, and show that the common thread through the observed dissolved oxygen problems is nutrient enrichment. EPA therefore believes that this nitrogen is the dominant source of impairment in the system.

Biochemical Oxygen Demand (BOD) from direct discharges to Upper Narragansett Bay has been shown to have minimal impact on dissolved oxygen levels (see D.R. Kester et al. / Marine Chemistry 53 (1996) 131-145, *Modeling, measurements, and satellite remote sensing of biologically active constituents in coastal waters.*)

EPA had more than sufficient basis to consider the MERL experiments when imposing a permit limit for nitrogen. The comment above does not specifically identify the relevance of any of the physical differences between the Providence/Seekonk River system and Narragansett Bay on the applicability of the model and how such differences impact the reasonableness of EPA's reliance on it. The physical differences between the respective water bodies as a whole do not negate or undermine the basic relevance of the MERL tank experiments to this permit proceeding, as the experiments were fundamentally designed to examine the relationship between nitrogen loading and eutrophic response variables. Indeed, EPA's guidance document *Nutrient Criteria Technical Guidance Manual, Estuarine and Coastal Marine Waters* cites the MERL experiments as compelling evidence that nitrogen criteria are necessary to control enrichment of estuaries. Specifically, the guidance states. "Three case studies provide some of the strongest evidence available that water quality managers should focus on N for criteria development and environmental control (see NRC 2000 for details). One study involves work in large mesocosms by the University of Rhode Island (Marine Ecosystem Research Laboratory–MERL) on the shore of Narragansett Bay. Experiments showed that P addition was not stimulatory, but N or N+P caused large increases in the rate of net primary production and phytoplankton standing crops. (Oviatt et al. 1995)."

Comment #B.2.b. Inaccuracies with respect to watershed sources of nitrogen.

RIDEM's analysis incorrectly assigns all the nitrogen discharged from the Ten Mile River to two wastewater treatment plants (WWTP) and makes conceptual and computational errors in estimating the delivery of these loads to the Seekonk River. These errors and inaccuracies magnify the potential impacts of the City's discharge on the Seekonk and Providence River System.

RIDEM attributes essentially all the nitrogen discharged at the mouth of the Ten Mile River to the Attleboro and North Attleboro discharges. See page 20 of The 2004 Evaluation, where RIDEM asserts that compared to these discharges "other watershed sources [of nitrogen] are assumed to be negligible". Although the discussion is with respect to the Blackstone River, RIDEM apparently applies the same logic to the Ten Mile River and the Attleboro discharge. This assertion apparently serves to justify the analysis presented on page 18 of The 2004 Evaluation that expresses the level of discharge of Nitrogen from the Ten Mile into the Seekonk River as a function of the level of discharge from the treatment plants.

This analysis is correct only to the extent that there are no other sources of nitrogen in the tributary River systems. However, virtually all studies done on the tributaries suggest that the two treatment plants contribute on the order of 60 % to 70 % of the nitrogen discharged into tributaries of the Providence and Seekonk Rivers.

> The Governor's Panel on Nutrient and Bacteria Pollution recognized the importance of other sources when it says ..."Other analyses show general agreement regarding total loading but decompose the "river/stream" component to provide more insight into sources by recognizing that it is, in large part, due to wastewater treatment facilities (WWTFs) and atmospheric deposition. Alexander et al. (2001) estimated that 62% of the total came from point sources, 19% from non-agricultural nonpoint sources, 6% from fertilizer and 3% from livestock in addition to the 10% from atmospheric deposition. Castro et al. (2001) estimated 73% of their total loading figure came from human sewage (through WWTFs and Individual Sewage Disposal Systems (ISDSs)), 13% from atmospheric deposition, 10.5% from agricultural runoff, and 3% from urban nonpoint sources. The analysis reported by Roman et al. (2000) estimated that wastewater treatment facilities contributed 73% of the nitrogen load, atmospheric deposition 23%, and agriculture 4%. RIDEM (2000)5 estimated that WWTFs contributed 66% of the total nitrogen to Upper Narragansett Bay; rivers and runoff (not including WWTFs) 30%, and direct atmospheric deposition 4%. Moore et al. (in press), using a similar but higher resolution technique than Alexander et al. (2001), estimated that total nitrogen load from the Providence /Seekonk River was 68% municipal wastewater, 15% atmospheric deposition, 14% runoff from developed lands, and 3% runoff from agricultural lands. All these analyses agree that wastewater treatment plants are the major source of nitrogen to the Bay. (See http://www.ci.uri.edu/GovComm/Documents/Phase1Rpt/Docs/Nutrient-Bacteria.pdf, page 2)
>
> Also, studies conducted by the USGS indicate that for the Providence River system, approximately 68% of the total nitrogen load is from municipal wastewater treatment plants, with the remainder attributed to nonpoint sources. (see http://water.usgs.gov/pubs/sir/2004/5012/SIR2004-5012_report.pdf, page 23).

The erroneous assumptions adopted by RIDEM significantly impact their analysis, and overstates the impacts of the tributary treatment plants on the receiving waters. It can be shown by simple algebra that if the WWTP discharge is 70% of the total nitrogen load, and that the amount discharged from the Ten Mile to the Seekonk River is 60% of the amount discharged by the WWTP's, then the River Delivery Factor is more on the order of 42%, rather than the 60% used by RIDEM. This issue is important because it indicates that a discharge of 8 mg/l into the Ten Mile River is more like a discharge of 3.4 mg/l directly into the Providence and Seekonk Rivers simply because of natural attenuation of the nitrogen load.

Response #B.2.b: The estimates of the relative nitrogen loading cited by the commenter are based on annual average loading and underestimate the relative contribution of the Attleboro facility under summer conditions. The RIDEM data used to estimate the Ten Mile River attenuation rate was collected only during May – October, a period of relatively low nonpoint source loadings. In 1995 and 1996, the flow in the Ten Mile River during May - October represented only 31% and 29% respectively of the annual river flow. Using the average summer flows from the POTWs, the average DIN discharged from the facilities during the summer of 2007 (TN – 2 mg/l), the average summer background DIN calculated using summer average flow at the East Providence gage (minus the POTW flow) and the estimate of background DIN of 0.3 mg/l (from the estimate provided on page 20 of the RIDEM *Evaluation of Nitrogen Targets Report*), it can be estimated that the POTWs contribute over 90 percent of the DIN load during the May-October period, making the Rhode Island estimates more reasonable than those proposed by the commenter. As can be seen, Attleboro represents about 84% of the total POTW loading due to its high effluent nitrogen concentration. (The Atttleboro average TN concentration was 24.5 mg/l and the North Attleborough concentration was 7 mg/l). *See* Attachment 2 for flows used to make the estimates and Attachment 3 for calculated loads. Coupling the 90% loading with the 60% delivery factor yields an overall delivery of 54% (rather than 42% estimated by the City), which is closer to the Rhode Island estimate of 60%. In any event, as described previously, the attenuation rate in the Ten Mile River is expected to decrease with decreasing phosphorus levels (see Response #A.2 above and RIDEM Total Nitrogen Permit Modifications Response to Comments, June 27, 2005, p. 11 of 41 (addressing relationship of nitrogen attenuation through algae uptake in the Blackstone River).

Comment #B.2.c. Contradictory data are presented in the analysis.

In support of its arguments RIDEM presents a variety of plots and data from the MERL experiments as well as from a cruise in the summers of 1995 and 1996. The MERL data are synthesized in figures 1 through 11 of The 2004 Evaluation, and information for the 1995 and 1996 cruises are presented in figures 13 through 18 of The 2004 Evaluation. The MERL data show that high levels of chlorophyll result in increasing <u>average</u> dissolved oxygen, but lower instantaneous oxygen concentrations, owing to diurnal swings in oxygen production and consumption by phytoplankton. The plots presented by DEM appear to indicate that low values for dissolved oxygen (associated with the 8x, 16x and 32x loading conditions) occur <u>simultaneously</u> with the high chlorophyll values (See figures 3 and 9 of The 2004 Evaluation).

In contrast, the data from 1995 and 1996 show that the occurrence of low dissolved oxygen and high chlorophyll in the Providence and Seekonk river systems are not occurring simultaneously. On pages 13 through 16 of The 2004 Evaluation, RIDEM presents plots of oxygen and chlorophyll *a* concentrations at depth along a transect from the upper reaches of the Seekonk River, down to the Upper portions of Narragansett Bay. The plots show that the year with the worst

dissolved oxygen problem (1996) has far less chlorophyll *a* than 1995. The extent of hypoxia, both vertically in the water column and longitudinally along the length of the Rivers, is far greater in 1996 than in 1995, whereas the 1995 chlorophyll data show far greater algal abundance. As discussed by RIDEM, there is a 10 fold difference in chlorophyll a from 1995 to 1996. This contradiction is further highlighted by the charts on page 17 of The 2004 Evaluation that show the higher the chlorophyll *a*, the higher the dissolved oxygen. These points are highly inconsistent with the underlying hypothesis of RIDEM and points out the importance of thoroughly understanding all the dissolved oxygen demands before establishing a dissolved oxygen restoration plan.

We should note that our preliminary investigations of the climatic conditions of the summers of 1995 and 1996 indicate that they were so radically different that they may not be simply averaged in the way that RIDEM has done without great caution. The summer of 1995 was among the driest recorded for 132 years of record at a location in the Blackstone watershed (34th driest), while the summer of 1996 was amongst the wettest (9th wettest). The difference could markedly impact the fate of pollutants in such a way as to make simple averaging of data across the two years inappropriate.

These extreme differences in climatic conditions is contrary to the claim made by RIDEM that its samples were taken during "typical summer season flows" (page 10 of The 2004 Evaluation), which would lead one to believe that the summers sampled reflected average or normal conditions. But it is consistent with the arguments made by RIDEM to explain the difference between 1996 and 1995 chlorophyll levels (page 11), where the difference in flushing times owing to higher river flows – which was a result of greater rainfall – is used to explain the year on year differences in chlorophyll a concentrations.

Response #B.2.c: Base on its review, EPA believes the commenter's conclusions above are based on a mischaracterization of the data. The MERL tank results referenced in the comment do not indicate that low dissolved oxygen levels occur simultaneously with high chlorophyll *a* levels for any of the high treatments (*i.e.*, high loading conditions), except the highest treatment level (32x), and even that treatment level shows simultaneous high chlorophyll and low DO only part of the time (compare chlorophyll measurements in Figure 9 to DO measurements in Figure 3).

EPA agrees that the plots of the 1995 and 1996 data show that high chlorophyll *a* and low DO do not necessarily occur simultaneously. Low DO in the lower water column would not necessarily be tied to the simultaneous phytoplankton activity in the upper water column but would be a function of many factors, including water temperature, stratification, and benthic oxygen demand. Low dissolved oxygen levels are not just driven by phytoplankton respiration (as measured by chlorophyll *a*) but also by phytoplankton that has settled to the bottom and exerts

a dissolved oxygen demand as it undergoes the decay process (see Response #B.2.a). In the upper water column high chlorophyll *a* concentrations generally occur simultaneously with high DO, as would be expected given the effects of photosynthesis (average dissolved oxygen increased due to the effects of photosynthesis induced supersaturation during the day), and this effect is shown on Figures 17 and 18. Both the MERL tank experiments and the data from the Providence/Seekonk River system indicate a clear correlation between nitrogen loadings, chlorophyll *a* levels, and dissolved oxygen impairment. The correlation between nitrogen loadings, chlorophyll *a* levels, and dissolved oxygen impairment is well documented in the *Nutrient Criteria Technical Guidance Manual – Estuarine and Coastal Marine Waters*. EPA understands (and does the commenter) that the MERL tank experiments cannot *completely* simulate all of the complexities of how chlorophyll *a* and dissolved oxygen respond to nitrogen loadings, including the timing of the response, in a natural system.

EPA also notes that even in the absence of DO violations the presence of nuisance algae is a violation of water quality standards.

The 1995 and 1996 data reflect different climatic conditions, and water quality standards must be met under both conditions. The data from both years indicate a system with excessive nitrogen concentrations and clear evidence (in the form of DO and chlorophyll *a* levels) of cultural eutrophication. RIDEM did present aggregate averages of water chemistry from the two surveys, but its analysis was clearly not limited to simply averaging the results from the two different years. Instead, the report clearly demonstrates that Rhode Island assessed the specific conditions observed in each of the two years.

Comment B.2.d. Unsubstantiated extrapolation of the MERL experiments to the Providence/Seekonk River system.

The use of the MERL data to analyze the Seekonk and Providence River system is questionable in that there are several critical and important differences between the conditions in the Bay and in the Providence and Seekonk River systems.

As RIDEM points out, on page 12 of The 2004 Evaluation, the MERL experiments were conducted under simulated flushing conditions that are almost 7.8 times lower than the conditions in the Providence River (27 day flushing time in the Bay versus 3.5 day flushing time in the River). The higher flushing rates of the Providence River would lead to lower nutrient loadings (expressed as mass per unit volume) and therefore much less algal activity. Indeed, RIDEM uses exactly this logic to explain why the observed chlorophyll a values in 1996 are an order of magnitude lower than observed in 1995. While RIDEM suggests that for some pollutants the hydraulic residence time might overstate the transport of the pollutant out of the river segment, no explanation, data or other information is presented as to how this would operate in the Providence and Seekonk River systems.

As a first approximation, the relationship between the standing concentration and flushing rates out varies inversely with respect to each other. Thus, an increase in flushing rate by a factor of 7.8 would result in a decrease in concentration of by a factor of 7.8. Stated another way, a loading rate of 32x in the Providence River will have the impact of a loading rate of 4x in the bay at large system.

The effect is even more dramatic for the Seekonk River. The 1991 studies cited by RIDEM indicate that the average flushing time of the Seekonk River is 1.2 days (See Asselin, S. and Spaulding M.L., Flushing Times for the Providence River Based on Tracer Experiments, Estuaries, Vol 16, No. 4, p 830-839, December 1993, page 838). Thus, for the Seekonk river system, the flushing rate is 22 times greater than the value used in the MERL experiments.

RIDEM also errs when it uses the MERL values, which are based on dissolved inorganic nitrogen (DIN) loadings to compute total nitrogen (TN) limits in the permits. Effluents from wastewater treatment facilities often contain residual, refractory organic nitrogen that is not biologically available, as RIDEM has acknowledged in its response to comments on the Rhode Island Permits (See page 18 of 41). If one accepts the area loading approach, and it is based on data developed around DIN, then the permit values ought be presented either as DIN, or adjusted to available Total N, in much the same manner that metals limits are adjusted from the biologically available form to total metals for permitting purposes.

Response #B.2.d: The average estimated flushing time in the Providence River during the May – October periods of 1995 and 1996 was about 3.5 days, much faster than the rate of 27 days used in the MERL experiments. However, the flushing rate during the critical period of high temperatures and low tributary flow rates during dry summer conditions, such as occurred in 1995, would be slower than 3.5 days. The indicators of cultural eutrophication were significantly greater in 1995 then they were in 1996. As indicated in Response #B.2.c, water quality standards must be met during both dry and wet years.

Differences in flushing rates between the MERL tank experiments and the 1995-1996 ambient data from the Providence/Seekonk River system is one of the key factors in our decision not to impose more stringent nitrogen load reductions at this time. It is therefore incorrect to suggest that EPA has not accounted for this difference. After implementation of the required nitrogen reductions at all POTWs, the permitted nitrogen loading rate to the Seekonk River will still reflect the 10x loading rate (see *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, RIDEM, December 2004). Water quality responses to a 10x nitrogen loading rate in the MERL tank experiments resulted in a significant level of impairment. In extrapolating these laboratory results to the natural environment, EPA determined that a 10x loading limit was reasonable to account for this uncertainty. See Response #A.1 above.

The 2004 loading study was done on data based on DIN, and the recommended loadings from the POTWs were developed using DIN. However, in establishing effluent limitations for POTWs the recommended DIN limits were adjusted to TN by increasing the recommended limits by 2 mg/l (see page 20). A check of effluent data from the Bucklin Point facility for 2007 confirms that the difference between TN and DIN averaged about 1.4 mg/l with a maximum of 2 mg/l, confirming that the RIDEM estimates are valid. (The DMR data for Attleboro could not be used because all of the components of DIN are not required to be reported).

Comment #B.2.e. Errors in the calculations of nitrogen loadings to the Providence and Seekonk Rivers.

RIDEM calculates the nitrogen loading on four different river segments by dividing the upstream nitrogen load by the area of the segment. As their analysis moves downstream, they add area and loads. This analysis ignores the fact that for half the day, because of tidal effects, the Seekonk River is "downstream" from the discharges of the NBC at Fields Point, East Providence, Cranston, Warwick and West Warwick and nutrients discharged by these point sources clearly influence the Seekonk River. Thus the loads expressed on an area basis on the Providence and Seekonk River system are significantly greater than calculated by RIDEM.

This is important because even without this consideration, RIDEM has difficulty reconciling the observed and implied concentrations of nitrogen in the upper reaches of the Seekonk River. See page 12 of 32 of RIDEM's Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers, where RIDEM compares the measured nitrogen concentration to the concentrations implied by the area loading rates of the MERL experiments. RIDEM observes that the actual measured concentrations are far lower than the MERL values for comparable area loading rates, with the observed values being one-fourth the value predicted by the MERL data. Had RIDEM properly included some fraction of the Fields Point, East Providence, Cranston, Warwick and West Warwick loadings to the Seekonk River in this calculation, the MERL predicted values should be even more than four times higher than the observed concentrations. This clearly points out the fallacy of extrapolating the results of the MERL experimental area loading rates to the Seekonk and Providence Rivers.

Response #B.2.e: Dye studies conducted for the Narragansett Bay Commission (NBC) on the Fields Point Wastewater Treatment Facility discharge in August 1989, indicate that there is minimal upstream transport of wastewater effluent. See *Preliminary Report - Summer Survey Dye Dilution Studies Field's Point Wastewater Treatment Facility Providence, Rhode Island.*

EPA recognizes that there are differences between the Providence/Seekonk River system and the MERL tank experiments (*see, e.g.*, Response #A.1, B.2.a, B.2.c, and B.2.d). The fact that nitrogen levels in the MERL tank experiments were

higher than measured levels in the Providence and Seekonk Rivers for the same loading per unit area is not unexpected given that the MERL tank cannot exactly replicate the complex dynamics of the Providence and Seekonk Rivers. In addition to differences in flushing rates, other factors contributing to the differences in nitrogen concentration between MERL tank experiments and the Providence/Seekonk River data include uptake by macroalgae and denitrification in the bottom waters. The dissolved oxygen response, however, was worse in the 1995 -1996 field data than in the MERL tank experiments for a given nitrogen loading rate. The contents of the tanks in the MERL experiments were routinely mixed and so do not represent the stratified conditions such as occurs in the Providence and Seekonk Rivers. Stratification exacerbates the dissolved oxygen response to nitrogen driven eutrophication.

Comment #B.2.f. RIDEM fails to incorporate all available information into its analysis.

RIDEM uses data from the 1995/1996 time frame to analyze the condition of the Providence and Seekonk River systems. They appeared to have ignored other readily available sources of information concerning the dynamics of dissolved oxygen in the Providence and Seekonk rivers that could serve to validate their analyses. In particular, RIDEM participated in an EMPACT program that deployed continuous recording sensors (salinity, temperature, dissolved oxygen, amongst other parameters) at various locations in the Providence and Seekonk River systems for upwards of two years. That information is available on the worldwide web at http://www.narrabay.com/empact/. Combined with concurrent discharge monitoring reports from the various wastewater treatment plants and flow data gathered from USGS gages, this would result in an extensive data set that could serve to validate RIDEM's conclusions. The lack of analysis of this information in the December 2004 report is surprising.

Response #B.2.f: It is not clear how the commenter believes that EPA should specifically use the referenced EMPACT data in development of nitrogen limits for this permit. Data for the critical summer periods are available from only two sites. The data include dissolved oxygen and chlorophyll *a* levels but not nitrogen levels. There are also no tributary nitrogen loading rates concurrent with the dissolved oxygen and chlorophyll *a* data.

The data do, however, provide additional documentation of the severity of the eutrophication. For example, a review of the data for the Phillipsdale station, located in the Seekonk River just upstream of the confluence with the Ten Mile River, shows that on July 16, 2007, minimum surface and bottom DO were less than 4 mg/l, maximum surface DO reached almost 20 mg/l (250 percent of saturation), and surface chlorophyll concentrations were over 80 ug/l. These data indicate that there are frequent periods during the summer months when dissolved oxygen levels and chlorophyll *a* levels reflect significantly impaired water quality.

Comment #B.2.g. EPA improperly speculates on the effects of the current permit.

In discussing its findings, EPA speculates that the 40% nitrogen attenuation ascribed by RIDEM to the Attleboro discharge [] will lower in the future because the phosphorus limits in the draft permit will reduce phosphorus driven eutrophication. This is true only in the special case that phosphorus from the treatment plants was the only limiting factor that controlled algal growth in the period reviewed by RIDEM. However, other factors – temperature, light penetration, cloud cover, and residence time all impact algal growth. EPA has provided no evidence to show that these factors were not limiting algal growth, and accordingly their speculation is inappropriate. In order to reach the conclusion that EPA has adopted, it would be appropriate for the Agency to develop a detailed TMDL that considers all factors influencing algal growth.

Response #B.2.g: Consistent with national guidance (Nutrient Criteria Technical Guidance Manual – Rivers and Streams, USEPA, July 2000), limiting phosphorus inputs is the key to controlling cultural eutrophication in fresh water systems. The permits being issued to North Attleborough and Attleboro will result in a substantial reduction in permitted loadings of phosphorus. Such phosphorus reductions will reduce (or eliminate) cultural eutrophication in the Ten Mile river system, and therefore there will be less plant life to uptake nitrogen, resulting in a lowering of the nitrogen attenuation rate (see Response B.2.b above). While the physical factors cited in CDM's comment (temperature, light penetration, cloud cover and residence time) can impact algal growth in the fresh water system, the only one of the cited factors that may significantly change in the future is light penetration, as surface plant growth decreases. While this may promote a change in the plant community, EPA believes that a net reduction in attenuation is inevitable. See responses above regarding the imposition of a water quality-based limit in the absence of a TMDL.

Comment #B.3: The permit calculates effluent metals limits based on 100 mg/l of hardness, which reflects the hardness of the upstream receiving water. However, the Wastewater Treatment Plant discharges effluent with a significantly higher hardness, approximately 250 mg/l, and thus the downstream receiving water, under 1.4:1 dilution conditions can be expected to have a hardness of approximately 207 mg/l. Under this condition, the permit limits ought to be as follows:

Constituent	*Monthly Limit*	*Daily limit*
Cadmium	0.6	6.3
Copper	24.3	38.9
Zinc	310.7	310.7
Lead	11.2	288.6
Nickel	135.1	1215.6
Silver		18.5

This approach has been used several times in recent Massachusetts permits, including Southbridge, Upton, and Northbridge.

Response #B.3: While effluent hardness is at times as high as 250 mg/l, at other times it is much lower. In determining appropriate hardness levels for permit limit development, EPA focuses on low flow conditions in order to approximate hardness level during the critical conditions. Effluent hardness data from the August quarterly toxicity tests for 2003 and 2004 indicate very different results. In 2003, the effluent hardness average was 177 mg/l, but in 2004, the effluent hardness average was only 97 mg/l. Using an in-stream hardness value of 100 mg/l ensures that criteria will be met under all effluent and receiving water conditions. Therefore, EPA has opted to use the lower hardness value when calculating the permit limits. This approach is appropriate given the toxicity of metals to aquatic life in the receiving water.

Comment #B.4: This permit eliminates a permit limit for chromium, based on the fact that the data shows no reasonable potential to exceed water quality criteria in the receiving water. The same conclusion can be reached for zinc, and the zinc limit should be eliminated from the permit. As with chromium, testing will be conducted periodically as part of the WET testing, thus providing EPA with continuing assurance that the plant is discharging low levels of zinc.

Response #B.4: We concur and have eliminated the zinc limit from the permit. The maximum monthly average zinc level in the effluent was 60 ug/l (see Fact Sheet), which is significantly less than the Massachusetts criterion or the Rhode Island criterion (see RIDEM comment below).

Comment #B.5: Aluminum is a component of several highly effective coagulants commonly used in wastewater treatment to provide control of metals and phosphorus and to improve overall process performance. The Attleboro plant has successfully used Polyaluminum chloride (PAC) over the past two years, resulting in overall enhancement of plant effluent, especially with respect to phosphorus levels in the discharge as compared to previous use of alum. Changing out this coagulant would likely cause operational difficulty for the plant.

The water quality criteria for aluminum indicates that the chronic criteria for aluminum may be overly restrictive. It says:

> There are three major reasons why the use of Water-Effect Ratios might be appropriate. (1) The value of 87 g/l is based on a toxicity test with the striped bass in water with pH= 6.5-6.6 and hardness <10 mg/L. Data in "Aluminum Water-Effect Ratio for the 3M Plant Effluent Discharge, Middleway, West Virginia" (May 1994) indicate that aluminum is substantially less toxic at higher pH and hardness, but the effects of pH

and hardness are not well quantified at this time. (2) In tests with the brook trout at low pH and hardness, effects increased with increasing concentrations of total aluminum even though the concentration of dissolved aluminum was constant, indicating that total recoverable is a more appropriate measurement than dissolved, at least when particulate aluminum is primarily aluminum hydroxide particles. In surface waters, however, the total recoverable procedure might measure aluminum associated with clay particles, which might be less toxic than aluminum associated with aluminum hydroxide. (3) EPA is aware of field data indicating that many high quality waters in the U.S. contain more than 87 g aluminum/L, when either total recoverable or dissolved is measured.

See http://www.epa.gov/waterscience/criteria/wqcriteria.html#L2, footnote L.

Recognizing:

The importance of aluminum in the wastewater industry,

The fact that the toxic effects that drove the development of the chronic criterion were for ambient environmental conditions far different (hardness of 10 versus hardness of 207) from that of Attleboro,

Attleboro's demonstrated ability to consistently meet its chronic WET limit, which shows the nontoxic nature of Attleboro's effluent

The limit on aluminum should be struck from the permit.

Response #B.5: The acute and chronic criteria used to calculate the aluminum limits are those adopted by MassDEP into its water quality standards, and so must be used as the basis for the effluent limitations. EPA must limit pollutants which have the reasonable potential to cause or contribute to exceedances of water quality standards. EPA has determined in this case that the discharge of aluminum from the facility has such a potential.

We are aware that there are concerns regarding the aluminum criteria, specifically that the chronic criteria may be overly conservative for some waters. If MassDEP were to propose, and EPA approve less stringent criteria, these would be the basis for future limits.

Whole effluent toxicity tests are designed to determine if there are any additive or synergistic toxic effects of the various pollutants in the effluent using a specific organism, and WET limits are not substitutes for chemical- specific limits. They are not designed to assess the toxicity of individual pollutants.

On September 12, 2006, the following comments were received from the Rhode Island Department of Environmental Protection:

Comment #C.1: The Rhode Island Department of Environmental Management (DEM) has reviewed the permit limits contained in the draft permits referenced above and determined that many of these limits will result in violations of Rhode Island Water Quality Standards in RI waters. The Environmental Protection Agency (EPA) established all water quality-based permit limits using background concentration of zero and by allocating 100% of the criteria. As a result, the limits for the Attleboro facility were based on the assumption that the entire pollutant load from the North Attleborough facility was eliminated from the water column before reaching the Attleboro facility. This assumption is not reflective of actual conditions and when coupled with allocation of the entire criteria, results in permit limits that cause violations of RI Water Quality Standards. In addition, EPA has utilized an in-stream hardness value of 100 mg/l to compute the water quality criteria for metals. This value is significantly higher than values typically observed in RI waters and results in higher water quality criteria than DEM would anticipate. Please provide information to support the use of this hardness value.

The table below, compares the in-stream concentrations at the MA/RI state line that result from the draft permit limits, to the RI Water Quality Standards (please note that for the sake of this analysis the hardness of 100 mg/l was utilized based on the assumption that EPA will provide justification for using this value). The concentrations that will result at the state line were computed from a mass balance using a 7Q10 flow at the state line of 14.4 cfs (or 2.71 cfs, based on flow data collected from USGS gauge # 01109403 after subtracting out historical WWTF flows), the WWTF flows and pollutant concentration limits contained in the draft permits and are artificially low as the EPA assumption of pollution concentrations of zero upstream of the North Attleborough WWTF was also used. Attached is a spreadsheet that contains the details of this analysis.

	Ten Mile River Concentration at the RI Border[1]	RI Water Quality Standard	% Exceedance of RI Water Quality Standards
Phosphorus	0.177 mg/l	0.025 mg/l[2]	606 %
Copper	10.5 ug/l	9.3 ug/l	12.9%
Lead	3.6 ug/l	3.2 ug/l	14.3%
Aluminum	98.5 ug/l	87 ug/l	13.2%
Zinc	135.5 ug/l	120 ug/l	13.1%
Cadmium	0.32 ug/l	0.27 ug/l	19.0%
Cyanide	5.2 ug/l	5.2 ug/l	0%

[1]As noted above predicted concentrations are artificially low since the EPA assumption of pollutant concentrations of zero upstream of the North Attleborough WWTF was utilized.

[2]Rule 8.D.(2) of the Rhode Island Water Quality Regulations establishes the following criteria for Nutrients:

> *"Average Total Phosphorus shall not exceed 0.025 mg/l in any lake, pond, kettlehole or reservoir, and average Total P in tributaries at the point where they enter such bodies of water shall not cause exceedance of this phosphorus criteria, except as naturally occurs, unless the Director determines, on a site-specific basis, that a different value for phosphorus is necessary to prevent cultural eutrophication."*

Determination of whether the water quality criterion of 25 ug/l is applicable to the Ten Mile River requires an evaluation of whether it flows into a lake, pond or reservoir (including whether run of the river impoundments constitute a lake, pond or reservoir). For the development of nutrient criteria, the EPA document titled *Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs: First Edition* has defined lakes as natural and artificial impoundments if they have a surface area greater than 10 acres and a minimum mean water residence time of 14 days. The Turner Reservoir on the Ten Mile Rivers meets both criteria and receives most of its flow from the Ten Mile River; therefore, the criterion of 25 ug/l must be met in the Ten Mile River at the point where it enters Turner Reservoir.

The table below is excerpt from the Final 2004 and the draft 2006 Rhode Island List of Impaired Waters ("303(d) list") and lists several waterbody segments that are impaired due to excessive metals and Phosphorus concentrations. As noted above the limits proposed by EPA would result in continued violation of many of these criteria even under the assumption that no other pollutant sources are present.

Waterbody ID	Waterbody Name	Cause
TEN MILE RIVER BASIN		
RI0004009L-01A	Turner Reservoir	LOW DO, Phosphorus, Lead (Pb), Copper (Cu) PATHOGENS
RI0004009L-01B	Turner Reservoir	LOW DO, Phosphorus, Lead (Pb), Copper (Cu) PATHOGENS
RI0004009L-02	Slater Park Pond	EXCESS ALGAL GROWTH/CHL-A, Phosphorus, PATHOGENS
RI0004009L-03	Omega Pond	Phosphorus, Lead (Pb), Copper (Cu)
RI0004009R-01A	Ten Mile River	Lead (Pb), Copper (Cu), Cadmium (Cd)
RI0004009R-01B	Ten Mile River	BIODIVERSITY IMPACTS, Copper (Cu), Lead (Pb)

As you know, pursuant to the NPDES regulations at 40 C.F.R. 122.44(d) and 33 USC Sec.1341(a)(2), NPDES limits must achieve compliance with water quality standards and limits must be included in permits where pollutants will cause, have

reasonable potential to cause, or contribute to an exceedance of the State's water quality. As noted above the limits contained in the draft permit will result in violations of RI water quality standards and therefore, the limits must be revised using a Waste Load Allocation (WLA) strategy that includes an appropriate margin of safety to account for any lack of knowledge concerning the relationship between effluent limits and water quality, ensures an equitable distribution of pollutant loads and that at a minimum meets all Rhode Island water quality criteria at the state line.

Response #C.1: Hardness data from Attleboro's quarterly toxicity tests conducted during the summer low flow period indicate that the average in-stream hardness above the North Attleborough discharge (Attleboro takes its dilution water from the Ten Mile River above the North Attleborough discharge) was 162 mg/l for 2002 – 2004 with a range of 100 mg/l – 253 mg/l. Using 100 mg/l for calculating the numeric criteria ensures that the criteria will be protective of in-stream uses (see also Response #B.3 above).

EPA notes that Rhode Island's analysis does not account for the dilutive impact of the Sevenmile River, which joins the Ten Mile River immediately below the state line, and also assumes that in-stream metals concentrations are 100% conservative in the water column, which is not necessarily the case. EPA believes these two factors are sufficient to offset the relatively small margin that Rhode Island's analysis shows water quality criteria to be exceeded.[15].

We concur with the comment that the phosphorus limit is not adequate to ensure that Rhode Island's water quality standards will be met in Turner Reservoir. Accordingly, EPA reopened the comment period to take comments on a proposed change in the phosphorus limit from 0.2 mg/l to 0.1 mg/l in order to ensure that the Rhode Island's nutrient criteria will be met, as well as to ensure compliance with the Massachusetts narrative water quality for nutrients. Please see below for responses to comments received during the reopened comment period.

On September 12, 2006, the following comments were received from the Massachusetts Riverways Program:

Comment #D.1: Staff at the Riverways Programs, MA Department of Fish and Game, have reviewed the draft NPDES permit for the Attleborough Water Pollution Control Facility discharging into the Ten Mile River. We appreciate the opportunity to review and comment on the draft NPDES permit. Protecting the health of the state's rivers, near coastal waters and estuaries is the driving force behind the Riverways Programs' work. The potential for point source pollution discharges to negatively impact our waterways heightens the role of NPDES permits in resource protection efforts.

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[15] Moreover, it also worth noting that to the extent that the City further enhances nutrient removal this will likely also result in reduced metals concentrations in the effluent.

The Fact Sheet in this draft permit packet presents an informative picture of water quality issues in the Ten Mile River and other waterways downstream of this discharge and the probable or potential impact the effluent poses to interstate waters and important resource areas. We are pleased to see permit limits instituting limitations below secondary treatment standards and are especially pleased to see daily maximum limits for several of the pollutants. It is clear water quality based limits are needed if the Ten Mile River is to ever achieve water quality standards and the permit limits in this draft permit are a needed step.

Response #D.1: The comments are noted for the record.

Comment #D.2: Stricter limits on nutrients are especially welcome. With the modest dilution available for this discharge and the known water quality issues, reductions in nutrient loads can not come quickly enough. The proposed limits are a positive step forward in reducing water quality impacts and we note the facility has been doing an admirable job at nutrient removal regularly achieving concentrations below existing limits. This sound performance raises a question about the necessity of the caveat contained in footnote # 13 of the draft permit requiring the facility to, "comply with the 1.0 mg/l monthly average total phosphorus limit within one year of the issuance date of the permit". Since the facility is already able to meet 1.0 mg/l limit throughout the summer, (data provided in attachment A) is it necessary to have this grace period for the winter limits?

Response #D.2: Since the winter phosphorus limit is a new requirement, and treatment operations under cold weather conditions are different than treatment operations at other times of the year, it is reasonable to allow a one year schedule to make the necessary adjustments to the chemical dosing system. A multi-year schedule, however, is not justified since significant capital improvements are not necessary to achieve this limit.

Comment #D.3: Given the severe water quality issues in the Ten Mile River, including areas with excessive algal growth, and the downstream rivers and impoundments we wonder if consideration has been given to assigning load limits for total phosphorus or at least requiring the permittee to report total phosphorus loads during each of the summer months? A load limitation would provide further protection to a receiving water with documented eutrophication and knowing nutrient loads will help with management decisions and future modeling and assessment. This would also be true of total nitrogen. Knowing the loads through the year of this nutrient would be helpful to Rhode Island in its efforts to refine total maximum daily loads entering into Providence River and Narragansett Bay.

Response #D.3: We have included a monthly average reporting requirement for phosphorus and nitrogen effluent loads, because these data will inform future management, assessment and modeling efforts relative to nutrients carried out by

EPA, Rhode Island and other parties. Load limits could be included in future permits if determined to be necessary to ensure attainment of water quality standards.

Comment #D.4: We agree with EPA's assessment that nitrogen loads from point sources are a significant contributor to the nitrogen loading in Narraganset Bay. The ammonia and total nitrogen limitations in the draft permit are necessary to help curb these loadings and work toward meeting water quality standards. We fully support maintaining the existing ammonia limitations and the total nitrogen limit.

Response #D.4: The comments are noted for the record.

Comment #D.5: The summary of the discharge monitoring data shows there has been a significant exceedance of total residual chlorine. Is year round chlorination required because of concerns about shellfish beds in downstream waters or could there be some consideration given to seasonal disinfection? Seasonal disinfection would reduce the potential for impacts from this highly toxic substance in the receiving water. If year round disinfection is necessary, the requirement for alarms on the chlorination and dechlorination systems adds additional protection against malfunctions that could lead to excessively or inadequately chlorinated effluent from entering the river. Ideally continuous monitoring would be added to this facility to add an even greater level of protection.

Response #D.5: Year round disinfection is required to achieve Rhode Island water quality standards, which require that bacteria criteria be achieved year-round. A well-operated disinfection system with the required alarms should minimize the potential for a toxic impact associated with chlorine. Continuous chlorine monitoring is something EPA is evaluating and, as stated in the Fact Sheet, continuous chlorine monitoring may be required in a future permit.

Comment #D.6: The Ten Mile River is a severely impaired waterway. One of the water quality problems contributing to impairment is associated with low dissolved oxygen. The draft permit requires daily sampling of the effluent and a minimum concentration of 6.0 mg/l. Given the existing conditions in the river, this is a vital measure of the effluent quality. The permit does not provide guidance on when the dissolved oxygen daily grab sample should be taken. Should the dissolved oxygen concentration in the effluent naturally fluctuate, sampling during depressed dissolved oxygen times or matching the monitoring of the effluent with the typical low dissolved oxygen periods in the receiving water, (early morning) might provide more information on how the effluent could impact, either enhance or exacerbate, oxygen levels in the Ten Mile River. If the concentrations are quite static than explicit requirements on the timing of the sampling is not necessary.

Response #D.6: In order to more accurately characterize the effluent and water quality data, we concur that the dissolved oxygen effluent sampling should be conducted in the early morning when levels will be at the daily minimum and have included this requirement in the final permit.

On September 14, 2006, the following comments were received from the City of Attleboro:

Comment #E.1: The City of Attleboro is very proactive in its endeavors to achieve the limits of the NPDES permit for the wastewater treatment plant. We have worked very hard to meet current NPDES imposed treatment limits. At present, the City is working on a Comprehensive Wastewater Management Plan and our $30 million dollar upgrade now under construction.

Response #E.1: The comments are noted for the record.

Comment #E.2: With regard to metals we feel the Attleboro facility has maximized its ability to remove metals. Any further removal would have to be achieved at the point source industries. Further, we feel that the stringent limits proposed are not warranted. Positive bioassay testing from 2003 to present have had no toxicity failures, which proves that the impacts of metals discharged from the Attleboro facility are consistently not compromising the integrity of the Ten Mile River. (A copy is enclosed as Attachment A of the results of our bioassay testing for the past 3 years).

The City of Attleboro's Industrial Pretreatment Program was established in September 1984. We have a full time Industrial Pretreatment Coordinator overseeing 29 permitted industries. We are required to sample each industry on a semi annual basis along with requiring each industry to submit quarterly sample results to insure compliance. The City also conducts an annual total toxic organics sampling, as well as, inspections of all permitted industries once a year. Further, the City takes additional samples when inconsistencies are detected. The City continues to work with the Industries to provide assistance to improve the quality of their wastewater discharges to the municipal wastewater treatment plant.

Attachment A

September 14, 2006

The following is a list of all quarterly Bioassays conducted at the City of Attleboro' s Wastewater Facility dating back to November 2003 . All tests were successful except for February 2005. There were two invalid tests because the diluent did not meet the passing criteria using the freshwater species C. Dubia. The EPA was asked and granted permission to use a synthetic, soft reconstituted water to culture freshwater test organisms. All Bioassays since February 2005